Risk Factors Associated With West Nile Virus Fatality in Horses

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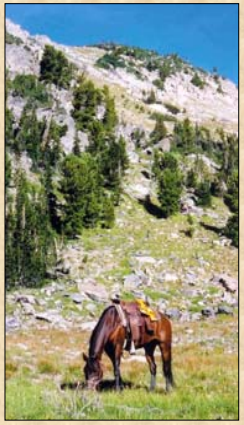
Objective

The objective of this study was to describe the temporal nature and apparent risk factors for WNV death in horses in South Dakota and the surrounding area in 2002.



Materials and Methods

Equine cases with confirmed WNV infections occurring in the summer of 2002 from the South Dakota Animal Disease Research and Diagnostic Laboratory (SD-ADRDL) were examined.

A survey questionnaire was sent to the attending veterinarian of each WNV case. Questions included demographics (horse age, gender), horse location at time of illness, illness outcome (death or survival), date of illness onset, vaccination history, and recent travel history.

A horse was not considered immunized to WNV unless it received two WNV vaccinations (per label), and 3 weeks had passed after the second vaccination. Therefore, for this analysis, horses contracting WNV prior to the 3-week interval following the second vaccination were considered not immunized. The case fatality rate (CFR) is the percentage of horses that died from WNV compared to the total WNV cases.

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Introduction

West Nile Virus (WNV) was first recognized in the United States in 1999 in New York City. By 2001, it spread to eastern Iowa. During 2002, WNV spread nearly nationwide, encompassing all of South Dakota. WNV is a viral disease, transmitted by mosquitoes to various animals, including man and horses.

In horses, similar to corvid species (crows, blue jays), WNV causes significant mortality. In 2002, horses in SD were largely naïve to WNV, as relatively few were immunized prior to the epidemic of the summer. Therefore, a large number of susceptible equids were available for WNV illness and death in 2002.

Figure 1- Seven-day moving average of daily cases of West Nile Virus in horses in 2002

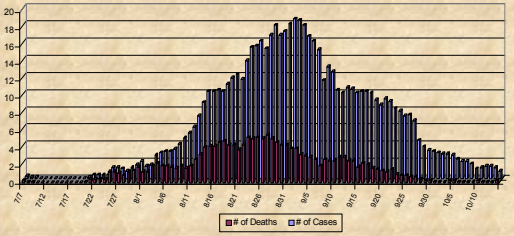
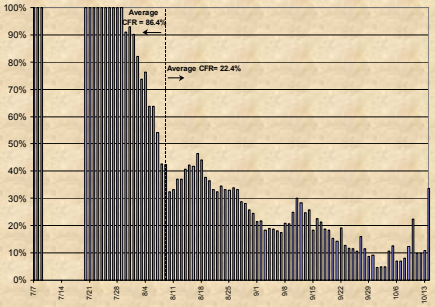


Table 1- Vaccination history of affected horses and case fatality rate based on number of vaccinations received

Vaccination History	# of Horses	# of Deaths	% Died
0 Shots	403	137	34.0%
1 Shot	181	44	24.3%
2 Shots not immunized	53	8	15.1%
≥2 Shots immunized	17	3	17.6%

Figure 2- Case fatality rate by week of onset of West Nile Virus in horses in 2002



Results

A total of 938 cases of confirmed equine WNV were observed in 2002 at the SD-ADRDL. 585 of these cases were horses from South Dakota which accounts for 62.4% of total cases. There was no indication that either age or gender, as defined as males (stallions, geldings, and colts) versus females (mares and fillies), were related to death rate (Tables 2 and 3).

The WNV epidemic in the South Dakota region began on July 1 and extended through October 14, 2002. The peak number of cases appeared during the week of 8/26 – 9/1 (Figure 1, blue bars). The rate of horse fatality initially appeared very high, with nearly 100% of affected horses dying. However, after August 9, the case fatality rate, appeared to decline. The average CFR before August 9 was 86.4%, whereas after this date, the average CFR dropped to 22.4%(Figure 2). This suggests that if a horse was affected by WNV after August 9, its chance of survival was greater.

Horses not vaccinated prior to WNV illness suffered a case fatality rate of 34%. Horses that received one vaccination experienced a case fatality rate of 24.3%. Those that received two vaccinations, but were not yet immunized, had a case fatality rate of 15.1% which was similar to the case fatality rate observed in the few horses considered immunized (Table 1).

Table 2- Gender of horses affected with WNV and case fatality rate for each gender

	# of Horses	# of Deaths	% Died
Females	298	93	31.2%
Males	341	105	30.8%

Conclusion

- WNV cases in horses began in early July, gradually built to a peak in very late August, and slowly declined until mid October
- WNV vaccination decreases the risk of death from WNV; two vaccinations are essential for initial protection
- The case fatality rate declined dramatically as the epidemic proceeded which may have been due to:
  - earlier illness detection by more attentive horse owners
  - better treatment by veterinarians as they developed experience with WNV
  - more horses were vaccinated and therefore, less likely to die
  - a change in WNV virulence
- There was no suggestion that age or gender affected the probability of death from WNV

Table 3- Age of horses diagnosed with WNV and case fatality rate for each age group

Age	# of Horses	# of Deaths	% Died
< 1 year	62	21	33.9%
> 1 year- 5 years	179	38	21.2%
> 5 years- 10 years	216	64	29.6%
> 10 years- 15 years	98	37	37.8%
> 15 years	118	44	37.3%

Abstract

In the summer of 2002, an epidemic of West Nile Virus (WNV) swept through South Dakota and the surrounding area. Horses in this region were almost exclusively naïve to WNV. Data about infected horses was obtained through surveys completed by attending veterinarians. Through data analysis, it appeared critical for horses to be immunized by early July through mid October as WNV cases occurred within this time frame. Horses that received two vaccinations appeared to have a higher survival rate, compared to those that received one or no vaccinations. Age and gender did not seem to have an effect on the probability of death among affected horses. Although the case fatality rate was initially very high, it declined throughout the course of the epidemic.

The staff of SD-ADRDL is acknowledged for the contribution in survey administration

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